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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/599,783 06/22/00 FURUKAWA

T BU9-99-197

EXAMINER

MMC1/0813

S JARED PITTS
SCHWEISER OLSEN & WATTS
18 EAST UNIVERSITY DR #101
MESA AZ 85201

EAT	ART UNIT	PAPER NUMBER
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2823 DATE MAILED:

08/13/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

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Office Action Summary

Application No.

09/599,783

Applicant(s)

FURUKAWA ET AL.

Examiner

Kurt M. Eaton

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 May 2001.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 5/3/01 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other:

DETAILED ACTION

Drawings

1. The corrected or substitute drawings were received on 6/4/01. These drawings are acceptable.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 21 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claimed subject matter not found enabling by the specification includes the limitation "wherein the step of patterning the layer of metallic germanium comprises: depositing a layer of photoresist; etching the metallic germanium layer through the layer of photoresist; and removing the layer of photoresist prior to the step of selectively etching the dielectric layer through the germanium hard mask".

Subject matter within claim 21 is disclosed in the specification and shown in Figures 2-4. A problem concerning enablement with the claimed subject matter arises, however, because the specification states "After etching layer 22 of metallic germanium, photoresist layer 24 is stripped away using techniques known in the art. The remaining germanium serves as a metallic germanium hard mask 25 over of dielectric stack 15 as shown in FIG. 3.". Specifically, while many techniques of stripping away photoresist layers are well known in the art, the examiner respectfully submits that it is

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generally not well known in the art how to selectively strip photoresist material with respect to metallic germanium. As evidence of what is well known in the art, prior art reference to Juengling (U.S. Patent No. 5,750,442) teaches it is well known in the art that, when stripping photoresist material from a device using "techniques known in the art", an underlying layer of metallic germanium is also removed. Therefore, using techniques known in the art, one of ordinary skill in the art would not be able to selectively remove photoresist material with respect to metallic germanium but could, predictably, remove both films simultaneously.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cho in view of Juengling, as previously applied in the Office Action mailed 3/26/01.

Response to Arguments

6. Applicant's arguments filed 5/31/01 have been fully considered but they are not persuasive.

Response to Arguments Concerning Rejection under 35 USC § 103(a)

7. Applicant contends claims 1-20 are patentable over the combination of Cho in view of Juengling because the teachings of Juengling, relating to a germanium layer, "are only to enhance the

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photoresist process and are apparently irrelevant to the actual etching of the semiconductor substrate”

The examiner respectfully submits that no teaching from Juengling as applied in the Office Action mailed 3/26/01 was directed towards the etching of the semiconductor substrate. Rather, Cho was used to provide relevance toward the actual etching of the semiconductor. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

8. Applicant contends there is a difference between the patterned metallic germanium material (16) found in Juengling and the patterned metallic germanium material of the instantly claimed invention because the patterned metallic germanium material is formed as a germanium hard mask. Due to the alleged definition of “hard mask” given by applicant, the patterned metallic germanium material of Juengling does not read on the invention because a “hard mask is a patterned layer which is used to protect portions of one or more layers beneath the hard mask while other portions of the layers beneath are selectively etched” (according to the applicant, the patterned metallic germanium material of Juengling is completely removed prior to any etching of the lower layers).

The examiner respectfully submits that the patterned metallic germanium material of Juengling is not completely removed prior to any etching of the lower layers {see Figure 3; column 3, line 51 - column 4, line 4 of Juengling}. Additionally, even though applicant interprets “hard mask” as stated above, there is no indication within the claims at issue that the patterned metallic germanium material is used to protect portions of one or more layers beneath it while other portions of the layers beneath it are selectively etched because applicants definition of hard mask implies that if the hard mask were not present, the lower lying layers would be blanketly etched. In terms of

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structure and function between the claimed invention and the applied combination of references, both patterned metallic germanium layers are made of germanium, are patterned, and do not necessarily constitute the top most layer within the stack of materials present within the etching atmosphere such that, if there were no patterned metallic germanium layer present, lower lying layers would be blanketly etched.

Furthermore, while the preamble does state "A method for etching a semiconductor substrate using a germanium hard mask...", the recitation of "using a germanium hard mask" has not been given patentable weight because the recitation occurs only in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). Accordingly, there is nothing the body of the claims to suggest the presence of a germanium hard mask being used as defined above.

9. Applicant asserts that it would not be obvious to combine the teachings of Juengling with the teachings of Cho because, while Juengling teaches that the scope of its invention involving the germanium layer added below the photoresist relates to "semiconductor processing steps in which a wafer having a nitride top layer is to be patterned by photolithography", the top layer of Cho is a silicon dioxide layer.

The examiner respectfully submits that the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of

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ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In the instant case, Juengling teaches that metallic germanium may be used as an effective anti reflective coating for use in photolithographic procedures which enhances line width control, reduces feature tolerances, and allows for more aggressive circuit design and also facilitates the complete removal of photoresists {column 1, line 24 - column 4, line 33}. Accordingly, in light of the teaching of Juengling, obviousness to provide a metallic germanium layer between the silicon dioxide layer and the photoresist layer of Cho exists because one of ordinary skill in the art would desire enhanced line width control, reduced feature tolerances, more aggressive circuit designs, and also facilitated removal of photoresists.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

11. Paper related to this application may be submitted directly to Art Unit 2823 by facsimile transmission. Papers should be faxed to Art Unit 2823 via the Art Unit 2823 Fax Center located in Crystal Plaza 4, room 4C23. The faxing of such papers must conform with the notice published in

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the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2823 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2823 Fax Center is to be used only for papers related to Art Unit 2823 applications.

Any inquiry concerning this communication of earlier communication from the examiner should be directed to **Kurt Eaton** at **(703) 305-0383** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via kurt.eaton@uspto.gov.


OLIK CHAUDHURI
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TECHNOLOGY CENTER 2800